CTEH
THE SCIENCE OF READY℠

ITC Tank Fire

Deer Park, TX

Air Sampling and Analysis Plan

Version 1.3

March 24, 2019

	Name/Organization	Signature	Date Signed
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Air Monitoring and Sampling Strategy

CTEH®, LLC is focusing on the mixtures, chemicals, and indicators of flammability chosen below because they are among the most important and readily monitored hazards of petroleum products and/or blends including: pyrolysis gasoline, naphtha, gasoline blend stock, toluene, xylene, and lube oil products. In theory, complete combustion of a hydrocarbon fuel would yield gaseous carbon dioxide (CO_2) and water; however, in situations where incomplete combustion occurs the composition of visible soot will contain both a particulate and gaseous component which may include the parent compounds (or mixtures) along with any combustion by-products formed. As such, this Sampling and Analysis Plan (SAP) outlines the analytes and methodologies to be utilized by CTEH® to monitor the air quality within the Community as defined herein. Due to the ever-changing nature of emergency events, monitoring and/or sampling for some of the chemicals described within this document may be conducted on a periodic basis or even discontinued as initial monitoring and/or sampling results indicate that these chemicals and indicators do not pose a concern to worker health. Combustion products will not be monitored in the absence of a fire.

The strategy is to utilize two broadly defined monitoring plans: **1)** Community Monitoring and **2)** Site Assessment. Community Monitoring may take place in those areas outside of the defined industrial areas in **Attachment 1**. Monitoring locations within the Community will focus on areas downwind of the ITC site and near locations likely to have sensitive receptors (schools, hospitals, nursing homes). Monitoring locations will be updated based on changing real-time conditions, as reported from the field. Unlike monitoring, Site Assessment does not necessarily represent ambient air monitoring near breathing zone level. Site Assessment may involve a variety of different monitoring tasks intended to provide information that may help to delineate the nature and extent of the release (e.g. fence line monitoring, worst case determination, container head space, ground level, etc.).

Free-roaming handheld real-time air monitoring may be conducted in a variety of areas based on levels of activity, proximity to the release, and site conditions. Fixed-location handheld real-time locations may be established in the Community in order to provide concentration averages that may be observed and analyzed over time in distinct geographic locations in the community. Specific equipment used to monitor for each analyte is listed in the plans below.

Discrete air samples are being collected several community areas and are being sent to an off-site laboratory for chemical analysis. A map of the current analytical air sampling stations is in **Attachment 1**. These analytical air sampling techniques may be used to provide air quality data beyond the scope of real-time instruments.

CTEH Site-Specific Action Levels

CTEH site-specific action levels may be employed in all air monitoring plans to provide information for corrective action to limit potential exposures. These values do not replace community exposure standards or guidelines but are intended to represent a concentration limit that triggers a course of action to better address public safety and community health. Action level exceedances will be communicated to Site Management and the CTEH Project Technical Director by the CTEH Project Manager (PM). Exceedances of action levels will be used to guide allocation of monitoring personnel and determine sampling locations to collect additional data. Should any detection exceed a value which would pose a risk for human health, ITC will be notified immediately. Site-Specific Action Levels are not utilized for Site Characterization monitoring.

Plan 1: Community Monitoring

Objective: Report air levels of analytes documented during monitoring efforts

Analyte	Action Level	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Total VOCs	0.5 ppm 5 minutes	Report reading to PM. Assess for the presence of benzene/toluene/xylene.	Approximate background level	MultiRAE PID AreaRAE PID	0.1 ppm	Measuring range: 1 – 5,000 ppm	NA
Benzene	1 ppm confirmed by 1 min reading	Communicate readings to PM to inform FOSC[1]. Delineate spatial extent of detections.	Based on 1 ppm level recommended by Unified Command	UltraRAE PID	0.025 ppm	UltraRAE - Change SEP tube upon detection for confirmatory reading. Record confirmatory reading.	NA
				Gastec tube #121L	0.05 ppm	Range: 0.1 – 65 ppm Volume: Variable	Var.
Toluene	33.5 ppm	Sample only as requested, Report reading to PM	½ EPA 8hr AEGL-1	Gastec tube #122L	0.5 ppm	Range: 1 – 100 ppm Volume: Variable	Var.
Xylene	65 ppm	Report Reading to PM	½ EPA 8hr AEGL-1	Gastec tube #123	1 ppm	Measuring range: 5 – 625 ppm	Var.
				Gastec tube #123L	1 ppm	Measuring range: 2 – 200 ppm	Var.

[1] Or other contact designated by Unified Command

Combustion Products[&]

Analyte	Action Level	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Particulate Matter ($PM_{2.5}$ or PM_{10})*	138 µg/m³ Sustained 5 min	Report reading to PM	Wildfire Smoke Guidelines for 1 hr. avg. upper-bound breakpoint for unhealthy for sensitive groups AQI	SidePak AM510	0.001 mg/m³	$PM_{2.5}$ impactor – 50% cut-off at 2.5 micron PM_{10} impactor – 50% cut-off at 10 micron	NA
$PM_{2.5}$ or PM_{10}*	79 µg/m³ 8 hr.	Report reading to PM	See above – 8 hr. guideline	SidePak AM510	0.001 mg/m³	See above	NA

*$PM_{2.5}$ is especially prone to interference from high humidity, in cases of high humidity, PM_{10} impactors may be used which are not as sensitive to humidity. In general, correction factors may be used to adjust PM readings for humidity. Monitoring for combustion products may be discontinued when the fire is extinguished.

[&] Particulate matter levels will only be evaluated on an as needed basis (i.e. if additional combustion events are observed).

Plan 2: Site Assessment

Objective: Characterize nature and extent of release

Analyte	Action Level	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Total VOCs	NA	Report reading to PM	NA	MultiRAE PID AreaRAE PID	0.1 ppm	Measuring range: 1 – 5,000 ppm	NA
Naphtha	NA	Report reading to PM	NA	Gastec tube #106	0.1 ppm	Measuring range: 0.5 – 28 ppm	Var.
Naphthalene	NA	Report reading to PM	NA	Gastec tube #60	0.5 ppm	Range: 0.5 to 14 ppm	Var.
Benzene	NA	Report reading to PM	NA	UltraRAE PID	0.025 ppm	UltraRAE – Change SEP tube frequently	NA
				Gastec tube #121L	0.05 ppm	Range: 0.1 – 65 ppm Volume: Variable	Var.
Toluene	NA	Report reading to PM	NA	Gastec tube #122L	0.5 ppm	Range: 1 – 100 ppm Volume: Variable	Var.
Hexane	NA	Report reading to PM	NA	Gastec tube #102L	1 ppm	Range: 4 – 1,200 ppm Volume: Variable	Var.
Hydrogen Sulfide	NA	Report reading to PM	NA	MultiRAE Sensor	1 ppm	Measuring range: 0 – 100 ppm	NA
				MultiRAE Pro Sensor	0.1 ppm	Measuring range: 0 – 100 ppm	NA
				MultiRAE PID	0.1 ppm	Measuring range: 0 – 5,000 ppm	3.3
				Gastec tube #4LL	0.1 ppm	Range: 0.25 to 2.5 ppm Volume: 1,000 mL	Var.
Xylene	NA	Report reading to PM	NA	Gastec tube #123	1 ppm	Measuring range: 5 – 625 ppm	Var.
				Gastec tube #123L	1 ppm	Measuring range: 2 – 200 ppm	Var.

Analytical Methods

Analyte	Media/Can	Method	Notes
VOCs	MiniCans (1L)	EPA TO-15 with TICs	

General Information on Procedures (Assessment Techniques) Used

Procedure	Description
Real-Time Handheld Survey	CTEH staff members may utilize handheld instruments (e.g. MultiRAE Plus; ppbRAE, Gastec colorimetric detector tubes, etc.) to measure airborne chemical concentrations. CTEH will use these handheld instruments primarily to monitor the ambient air quality at breathing zone level. Additionally, measurements may be made at grade level, as well as in elevated workspaces, as indicated by chemical properties or site conditions. CTEH may also use these techniques to verify detections observed by the AreaRAE network.
Fixed Real-Time Monitoring locations	Multiple Community locations may be identified and monitored at the same location approximately once per hour using handheld instruments. This allows the use of statistical analysis more effectively than with a random approach.
Analytical sampling	Analytical sampling may be used to validate the fixed and handheld real-time monitoring data, or to provide data beyond the scope of the real-time instruments. Analytical samples may be collected as whole air samples in evacuated canisters or on specific collection media, and sent to an off-site laboratory for further chemical analysis.

Quality Assurance/Quality Control Procedures

Method	Procedure
Real-Time	Real-time instruments may be calibrated in excess of the manufacturer's recommendations. At a minimum whenever indicated by site conditions or instrument readings. Co-located sampling for analytical analysis may be conducted, if necessary, to assess accuracy and precision in the field. Lot numbers and expiration dates may be recorded with use of Gastec colorimetric tubes.
Analytical	Chain of custody documents may be completed for each sample. Level IV data validation may be performed on the first sample group analyzed. Level II data validation may be performed on 20% of all samples. Level IV data validation may be performed on 10% of all samples.
Reporting	Daily data summaries may be provided for informational purposes using data that have not undergone complete QA/QC. Comprehensive reports of real-time and/or analytical data may be generated following QA/QC and may be delivered 60 days following receipt of validated results, if applicable.

Glossary

Term	Definition
Sustained	Instrument reading above the action level continuously for the listed time period.
Excursion Limit	Whenever a reading exceeds an ACGIH® TLV by 5 times (if the chemical does not have a STEL- or Ceiling-based action level), exit the area and notify the PM
Breathing zone	The area within an approximate 10-inch radius of an individual's nose and mouth.
Ambient Air	That portion of the atmosphere (indoor or outdoor) to which workers and the general public have access.

Change from version 1.0 to 1.1

In the section titled Air Monitoring and Sampling Strategy: Addition of sentences 3 and 4 in paragraph 2.
In the section titled Air Monitoring and Sampling Strategy: Addition of sentence 3 in paragraph 3.
In the section titled CTEH Site-Specific Action Levels: Addition of sentences 3 and 5.
Changed title of project: Updated from "Naphtha Tank Fire" to "Tank Fire"

	Name/Organization	Signature	Date Signed
Prepared by:	Scott Malm/CTEH	Scott Malm	3/18/19
Review by:			
Approved by:			
Approved by:			
Approved by:			
Approved by:			

Change from version 1.1 to 1.2

In the section titled: **Attachment 1: Action Levels Based on NOAA PACs, as requested by incident command**

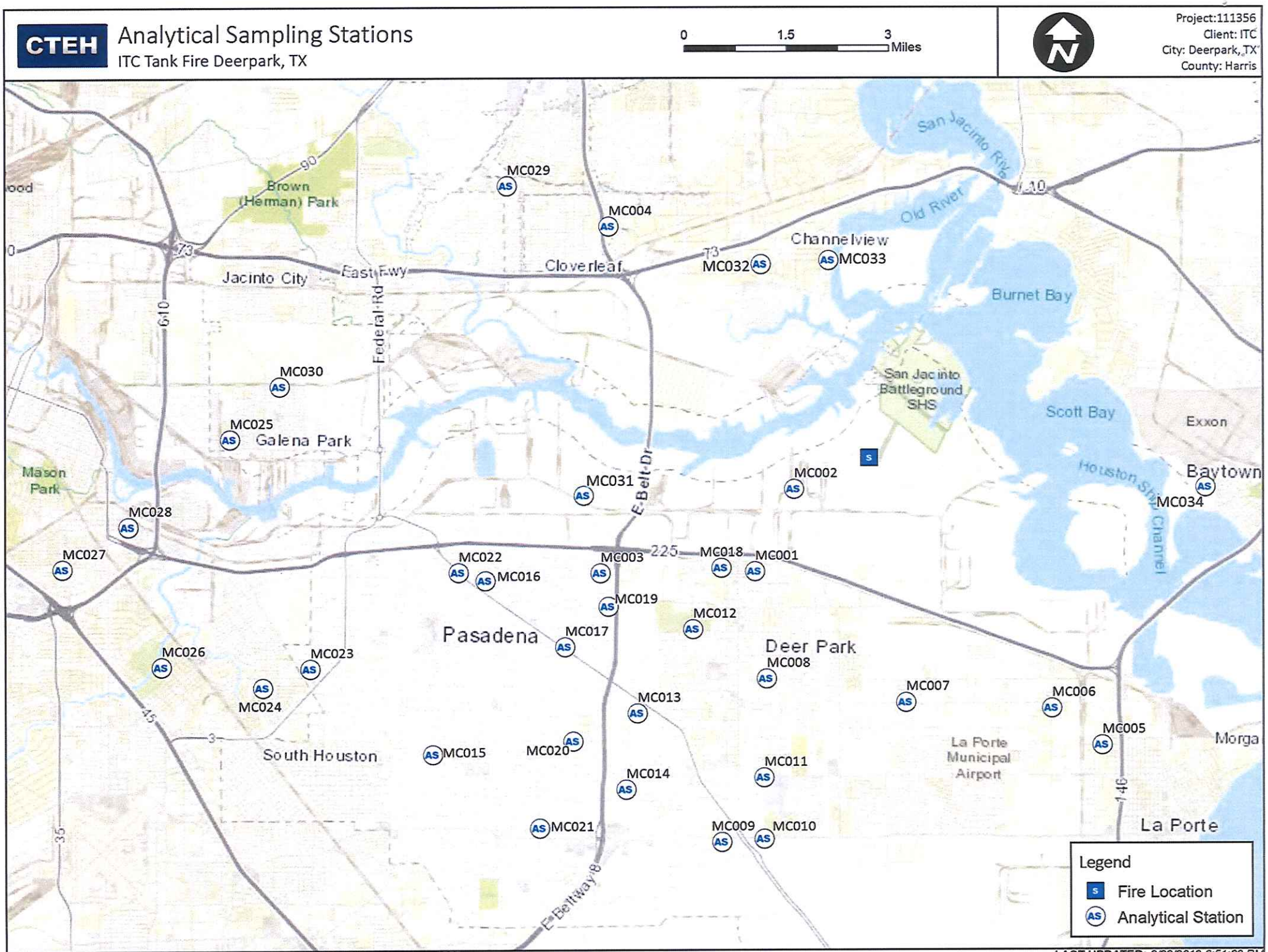
	Name/Organization	Signature	Date Signed
Prepared by:	Scott Malm/CTEH	Scott Malm	3/18/19
Review by:			
Approved by:			
Approved by:			
Approved by:			

Change from version 1.2 to 1.3

In the section titled: Plan 1: Action Levels and Basis updated. Target analyte list reduced to Total VOCs, benzene, toluene, xylene. Particulate Matter monitoring will continue on an as needed basis. Introductory text added/modified. Modification of basis of action levels in section introductory paragraph. Analytical sampling limited to VOC analysis.

	Name/Organization	Signature	Date Signed
Prepared by:	Pablo Sanchez Soria Ph.D., CIH/CTEH		3/22/19
Review by:	Mike Berg, Ph.D. CIH, CSP		3/23/2019
Approved by:			
Approved by:			
Approved by:			
Approved by:			

Attachment 1

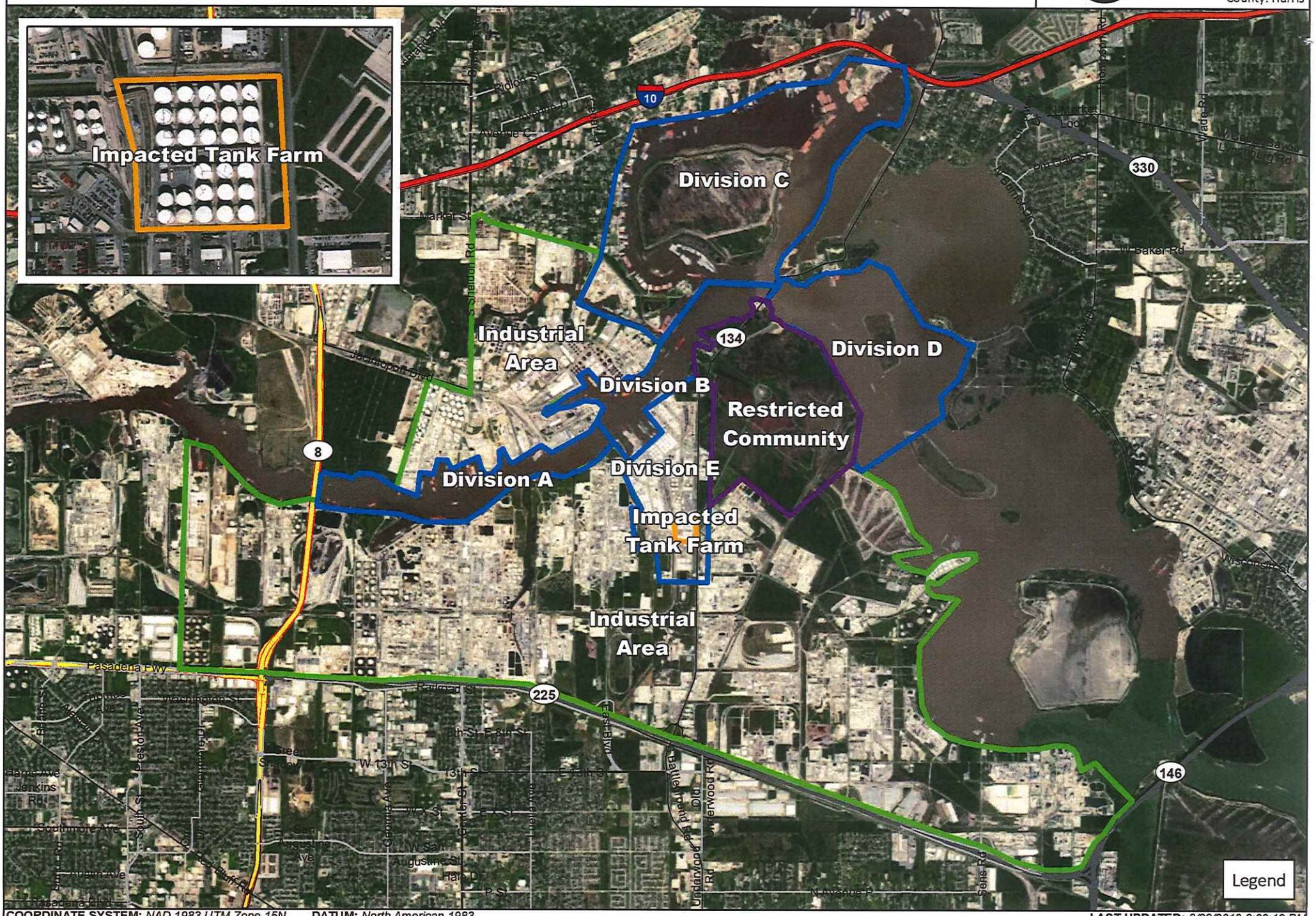

CTEH
Analytical Sampling Stations
ITC Tank Fire Deerpark, TX
0
1.5
3
Miles
Project:111356
Client: ITC
City: Deerpark, TX
County: Harris
MC029
MC004
MC032
MC033
MC030
MC025
MC031
MC002
MC034
MC028
MC027
MC022
MC016
MC003
MC018
MC001
MC019
MC012
MC017
MC026
MC023
MC024
MC008
MC007
MC006
MC013
MC005
MC015
MC020
MC011
MC014
MC021
MC009
MC010
Brown (Herman) Park
Jacinto City
East Fwy
Cloverleaf
Channelview
Old River
San Jacinto River
Burnet Bay
Federal Rd
610
E Belt Dr
San Jacinto Battleground SHS
Scott Bay
Exxon
Baytown
Houston Ship Channel
Galena Park
Mason Park
Pasadena
Deer Park
South Houston
La Porte Municipal Airport
La Porte
Morga
Legend
Fire Location
Analytical Station
COORDINATE SYSTEM: NAD 1983 UTM Zone 15N
DATUM: North American 1983
LAST UPDATED: 3/23/2019 6:51:09 PM

CTEH

ITC Fire Location Categories

0 0.5 1 Miles

Project: 111356
Client: ITC
City: Pasadena TX
County: Harris



COORDINATE SYSTEM: *NAD 1983 UTM Zone 15N* DATUM: *North American 1983*

LAST UPDATED: *3/23/2019 3:00:12 PM*